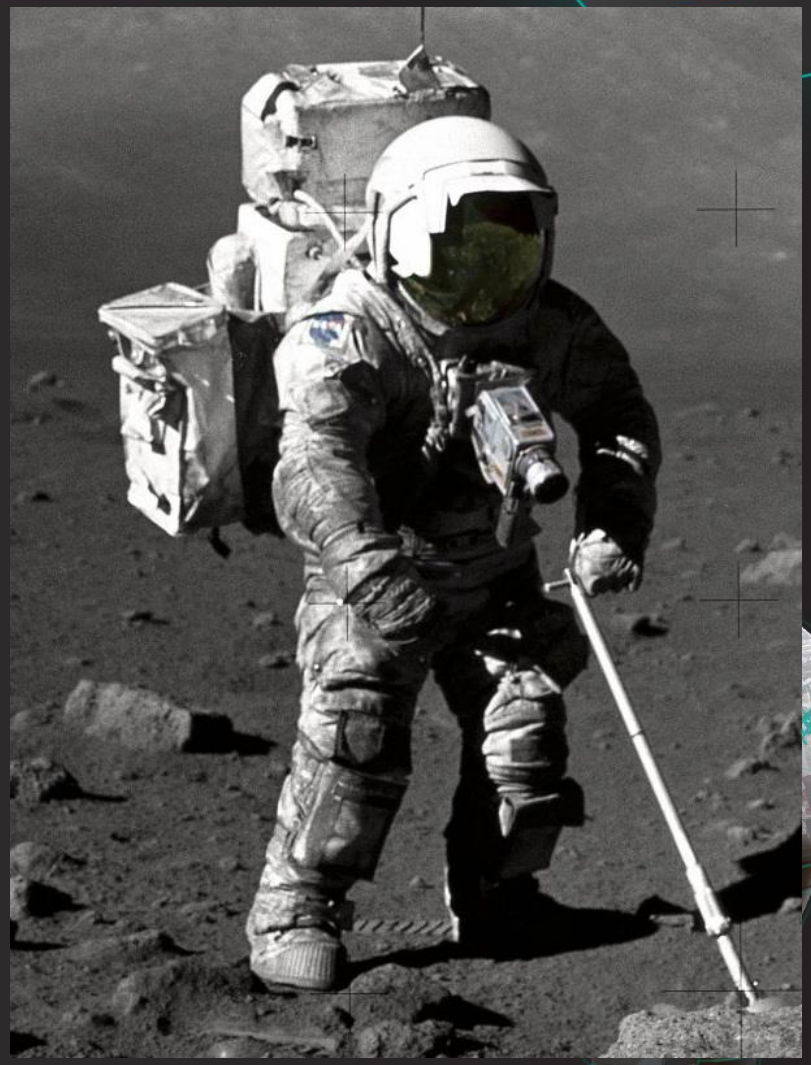
Dust/Regolith for Surface Exploration

- System-wide dust protection is a key design driver for xEMU surface operations, and development of dust proof mechanisms, bearings, materials, and coatings coupled with specific operations and surface architecture development is critical for success.
- Dust Proofing on the xEMU should protect against the following damage mechanisms
  - Dust Abrasion
    - Dusty surface directly damages outer material, resulting in reduced properties, additional migration and damage to other layers.
    - Mitigate through patterning (twill weave common in clothes), base materials selection, and protective coatings
  - Dust Adherence
    - Can change the thermal performance of the system, or introduce regolith and dust into the airlock or cabin environment, potentially harming crew members.
    - Mitigate by making the surface cleanable, or control the surface charging
  - Dust Penetration/Permeation
    - Create abrasion risks to fabric layers or other captured features beneath the outer layer and create damage
    - Mitigate by choosing tighter-weaves, closing gaps in integration, or using coatings to fill space of fabric
    - Choose fabrics that don't abrade other layers
- Current philosophy is fully integrated dust mitigation strategy with the TMG and exposed suit components
- Over garment, bunny suit, or "coveralls" could be considered as contingency or as an additional mitigation option for xEMU surface operations.



Wish List For xEMU Dust Environments

- Development of materials and coatings
- Dust-proof bearing and mechanism designs
- Softgoods designs and patterns for dust-mitigation
- Solutions to system level architecture and operations concepts, including airlocks and other surface architecture.
- Cleaning and maintenance operations for dirty surface environments